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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Fluid therapy with L-lactate and/or pyruvate anions.**

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(56) References cited:
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EP 0 249 667 B1

Table IV Footnotes

(1) Hartmann AF. Theory and practice of parenteral fluid administration. JAMA 1934; 103: 1349-1354.

(2) Dianeal is a trade mark of Travenol Laboratories, Deerfield, Illinois

(3) Facts and Comparisons. St. Louis: JB Lippincott, Oct 1981-Aug 1983: 35d-53.

(4) Esselliер AF, Jeanneret P. Agueous solutions - parenteral infusion therapy. Documenta Geigy 6th edition. Manchester: Geigy, 1962: 324-334

(5) The period of reperfusion of heart following, for example coronary by pass can be critical and may result in permanent heart damage due to excessive calcium loading. Pyruvate is the preferred substrate for heart under these conditions giving maximal efficiency of cardiac work over either glucose plus l-lactate or glucose alone (See Kobayshi K, Neely JR. The control of maximum rates of glycolysis in rat cardiac muscle. Circ Res 1979; 44: 166-175.

(6) Esselliер AF, Jeanneret P. Aqueous solutions - parenteral infusion therapy. Documenta Geigy 6th edition. Manchester: Geigy, 1962: 332-333

(7) Darrow and Pratt. JAMA 1950; 143: 365-ff and 432-ff.

(8) Martin et al. JAMA 1951; 147: 24-ff.

(9) See Table XI, Prior Art Hemodialysis Fluids. WO 86/00227

(10) Blood acetate levels above the physiolcgical level of 0.2 mM are associated with metabolic bone disease. Veech RL. Am J Clin Nutr 44: 544, 1986.

(11) Fox CL. JAMA 1952; 148: 827-833.

It is to be understood that the invention is not limited to the features and embodiments hereinabove specifically set forth, but can be carried out in other ways and manners.

Claims

Claims for the following Contracting States : BE, CH, DE, FR, GB, IT, LI, LU, NL, SE

1. A fluid composition for treatment of metabolic acidosis in a living human comprising water having dissolved therein the following components in the respective amounts indicated:

Component	Quantity (in mM)
Cations	
Na^+	0-2400
K^+	0-60
Ca^{2+}	0-4
Mg^{2+}	0-3
Anions	
l-lactate	0-2400
pyruvate	0-55
d-betahydroxy-butyrate	0-2400
acetoacetate	0-2400

provided that the total amount of l-lactate, pyruvate, d-betahydroxybutyrate and/or acetoacetate anions present in any given solution ranges from 0.1 to 2400 mM with the total amount of said cations being such as to achieve electrical neutrality in such given solution, and further provided that said solution has a pH ranging from 5 to 8.2.

2. A solution for rehydration, electrolyte replacement, and nutrition comprising water having dissolved therein the following components in the respective quantities indicated:

Component	Quantity (in mM)
Cations	
Na^+	130-160
K^+	2-10
Ca^{2+}	0.5-2.5
Mg^{2+}	0-1.5
Anions	
Cl^-	90-115
l-lactate$^-$	0-55
pyruvate	0-55
d-betahydroxy-butyrate	0-55
acetoacetate	0-55

provided that in any given said solution, the total amount of l-lactate, pyruvate, d-betahydroxybutyrate and/or acetoacetate unions present ranges from 0.1 to 55 mM with the total amount of said cations being such us to achieve electrical neutrality in any given said solution, and further provided that said solution has a pH ranging from 6.0 to 7.5.

3. A solution for dialysis therapy comprising water having dissolved therein the following components in the respective amounts indicated:

Component	Quantity (in mM)
Cations	
Na^+	130-145
K^+	0-4
Ca^{2+}	0.5-2.0
Mg^{2+}	0-1.0
Anions	
Cl^-	90-120
l-lactate$^-$	0-55
pyruvate	0-55
d-betahydroxy-butyrate	0-55
acetoacetate	0-55

provided that the total amount of l-lactate, pyruvate, d-betahydroxybutyrate and/or acetoacetate unions present in any given solution ranges from 0.1 to 55 mM with the total number of indicated cations present being such as to achieve electrical neutrality, and also provided that said solution has a pH ranging from 5 to 8.2.

4. The solution of claim 3 wherein said solution additionally contains from 20 to 55 mM of bicarbonate anions and wherein said solution also contains a sufficient portion of at least one of said l-lactate, pyruvate, d-betahydroxybutyrate, and/or acetoacetate anions which are derived at least in part from the addition to said solution of, respectively, at least one of l-lactic acid, pyruvic acid, d-betahydroxybutyric acid and/or acetoacetic acid in a total amount which is sufficient to produce a pH in the range from 5 to 8.2, and said solution contains sufficient nonionic dissolved nutrients to achieve a solution millios-molarity of from 250 to 550 mOsmoles/Liter.

5. The solution of claim 3 wherein said solution additionally contains from 20 to 55 mM of bicarbonate anions and wherein said solution also contains a sufficient portion of at least one of said l-lactate, pyruvate, d-betahydroxybutyrate, and/or acetoacetate anions derived from the addition to said solution of, respectively, at least one of l-lactic acid, pyruvic acid, d-betahydroxybutyric acid and/or acetoacetic acid in a total amount which is sufficient to produce a pH in the range from 5.5 to 7.5, and said solution also contains sufficient nonionic dissolved nutrients to achieve a solutions milliosmolarity of from 260 to 550 mOsmoles/Liter.

Claims for the following Contracting States : AT, GR, ES

1. A method of preparing a fluid composition for treatment of metabolic acidosis in a living human comprising forming an aqueous solution of the following components in the respective amounts indicated: